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| 10/787,211 | 02/27/2004 | Chein-Wei Jen | TW-WPA-0771 | 4688 |
| 62439 | 7590 | 09/17/2008 | EXAMINER | |
| SINORICA, LLC | | | MOLL, JESSE R | |
| 528 FALLSGROVE DRIVE | | | ART UNIT | PAPER NUMBER |
| ROCKVILLE, MD 20850 | | | 2181 | |
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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|------------------------------|--------------------------------------|-----------------------------------|
| Office Action Summary | Application No. 10/787,211 | Applicant(s) JEN ET AL. |
| | Examiner JESSE R. MOLL | Art Unit 2181 |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
 - If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
 - Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED. (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) Responsive to communication(s) filed on 26 June 2008.
- 2a) This action is FINAL. 2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) Claim(s) 6-10 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) Claim(s) _____ is/are allowed.
- 6) Claim(s) 6-10 is/are rejected.
- 7) Claim(s) _____ is/are objected to.
- 8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on _____ is/are: a) accepted or b) objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) All b) Some * c) None of:
1. Certified copies of the priority documents have been received.
 2. Certified copies of the priority documents have been received in Application No. _____.
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) Notice of References Cited (PTO-892)
 2) Notice of Draftsperson's Patent Drawing Review (PTO-948)
 3) Information Disclosure Statement(s) (PTO/SB/08)
 Paper No(s)/Mail Date _____
- 4) Interview Summary (PTO-413)
 Paper No(s)/Mail Date. _____
- 5) Notice of Informal Patent Application
 6) Other: _____

DETAILED ACTION***Claim Rejections - 35 USC § 101***

1. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

Claims 6-10 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. Independent Claim 6 claims a method and then recites mainly limitations regarding structure. It appears that Applicant is attempting to claim both a method and an apparatus. The claimed method contains no steps and while the structure claimed is limited to have functional connection, none of these limitations is related to the method claimed. Examiner suggests changing the limitation "A method for inter-cluster communication" to A method for inter-cluster communication in a processing system", changing the structural limitations so that the structure be comprised within the system. For example, changing "where clustered functional units have..." to the processing system comprising clustered function units which have..." Additionally, Examiner suggests adding the functional relationships between the structural elements as steps of the method. Claims 7-10 are rejected because they depend from claim 6 and do not correct this problem.

Claim Rejections - 35 USC § 103

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1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 6-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Berenbaum et al. (U.S. Patent Number 6658551 B1) herein referred to as Berenbaum in view of Zalamea et al. (Hierarchical Clustered Register File Organization for VLIW Processors), herein referred to as Zalamea.

1. Claims 6-10 are rejected under 35 U.S.C. 102(a and e) as being anticipated by Berenbaum et al. (U.S. Patent Number 6658551 B1) herein referred to as Berenbaum.

2. Regarding claim 6, Berenbaum discloses A method for inter-cluster communication that employs register permutation, where clustered functional units (Functional Units [FU]; see fig. 8) have at least one global register file (Including all register Files; see Fig. 8; *Note that the term "register file" is interpreted as a group of registers and a group of register files is still a register file*); the at least one global register file is partitioned into at least one sub-register file (each individual register files; see Fig. 8), wherein the at least one sub-register file can map to at least two clustered functional units respectively (each file can map to any of the functional units; see Fig. 8; col. 7, lines 8-15); wherein

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establishing a mapping relationship between a global register file and a clustered functional unit (by setting the crossbar switch 820; see Fig. 8); and the clustered functional units exchange data by permutation of the sub-register files of the at least one global register file through setting crossbar switches (see Fig. 8; Col. 7, lines 12-15), without transferring the data (banks are chosen by changing the crossbar switch not by copying data to the other register files; by controlling the crossbar switch, the connections between register files and functional units is changed without moving data), wherein the permutation maps the sub-register files of the at least one global register file to the clustered functional units (by setting the crossbar switch 820; see Fig. 8; col. 7, lines 12-15).

Note that crossbar logically switches positions of the global registers, it is interpreted as exchanging data between the registers when viewed in light of the specification. The specification shows that register data is only virtually exchanged in the same way that Berenbaum discloses.

Berenbaum does not explicitly disclose at least one local register file; each of the at least one local register file maps to one of the clustered function units, wherein establishing a mapping relationship between a global register file, a local register file and a clustered functional unit.

Zalamea teaches at least one local register file (Local register files C16; see Figure 3); each of the at least one local register file maps to one of the clustered function units (See Figure 3), wherein establishing a mapping relationship between a global register file, a local register file and a clustered functional unit (see Figure 3; Section 4, first paragraph).

At the time of the invention, it would have been obvious for one of ordinary skill in the art to have modified the invention of Berenbaum, by adding at least one local register file maps to one of the clustered function units, wherein establishing a mapping relationship between a global register file, a local register file and a clustered functional unit, as taught by Zalamea, in order to increase execution speed of instructions that do not need to transfer data to global register files by using local register files.

3. Regarding claim 7, Berenbaum further discloses the register permutation is done by dynamically changing the port mapping between the sub-register files of the global registers and the functional units (with Input Crossbar Switch, see fig. 8).

Note that routing data from one place to another is considered mapping. Therefore, changing the destination of the register is considered changing the port mapping.

4. Regarding claim 8, Berenbaum further discloses the port mapping is done with a predetermined routing structure (Input Crossbar Switch; see fig. 8).

5. Regarding claim 9, Berenbaum further discloses the size of said portioned register file and number of said ports are both scalable (see cols. 5-7; note the variables N and K showing the scalability).

Further note that in any register file, the size is scalable. It would always be possible with minimal redesign to change the number of registers or ports. The claim merely states that the register file be able to have different sizes (be scalable).

6. Regarding claim 10, Berenbaum further discloses any number of cluster structures (M; see fig. 8).

Response to Arguments

7. Applicant's arguments with respect to claims 1-5 have been considered but are not persuasive.

Applicant states:

[Argument 1]: The current invention claims "the at least one global register file is partitioned into at least one sub-register file" (supported by Fig. 1 of the current invention). The cited prior art, Berenbaum et al, failed to teach the claimed limitation. Examiner is respectfully requested to provide a *prima facie* evidence for such a rejection.

Examiner disagrees. The term "Register File" is merely a group of registers and the term "Sub-register File" is merely a subset of that group. As shown above, Berenbaum teaches that specific limitation.

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Applicant states:

[Argument 2]: The current invention claims "the at least one sub-register file can map to at least two clustered functional units respectively" (supported by Fig. 1 of the current invention). The cited prior art, Berenbaum et al, failed to teach the claimed limitation. Examiner is respectfully requested to provide a *prima facie* evidence for such a rejection.

Examiner disagrees. As shown above, each sub-register file can map to any function unit.

Applicant states:

[Argument 4]: The current invention claims "the clustered functional units exchange data, ... without transferring the data". The cited prior art, Berenbaum et al, failed to teach the claimed limitation. Examiner is respectfully requested to provide a *prima facie* evidence for such a rejection.

Examiner disagrees. As stated in the previous Office Action, the data is moved in Berenbaum in the same way it is in Applicant's system. A register file (or sub-register file) which was previously connected (through a crossbar switch) to a first functional unit contains data. This data is "moved" by connecting the registers (which was connected to the first functional unit) to a second functional unit; thereby exchanging the data from the first functional unit to the second functional unit. Examiner requests that Applicant make specific arguments directed to how the claimed invention (particularly the limitation "the clustered functional units exchange data, ... without transferring the data") is not anticipated by this method as taught by Berenbaum.

Applicant states:

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[Argument 7]: Berenbaum et al teach "instruction packet splitting" that a VLIW processor selectively issues and process a portion of the bundled VLIW instruction within a cycle. The non-selected portions of the bundled VLIW instruction are issued and processed by subsequent cycles. The current invention disclosed "permutation of sub-register files of a global register file" for each functional unit to access the desired exchanging data directly to a storage (global register file) where the functional unit was not formerly associated with. The datum remains at where it is stored. The route of data accesses of each function unit is changed through the permutation.

Examiner disagrees, see above regarding Argument 4 for how this limitation is met. While Berenbaum does teach "instruction packet splitting", it also teaches mapping registers to different functional units. When the mapping is changed, the data is exchanged (as with any memory crossbar).

All remaining arguments are discussed in the rejection above.

Conclusion

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jesse R. Moll whose telephone number is (571)272-2703. The examiner can normally be reached on M-F 10:00 am - 6:30 pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Alford Kindred can be reached on (571)272-4037. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Jesse R Moll
Examiner
Art Unit 2181

/J. R. M./

Examiner, Art Unit 2181

/Niketa I. Patel/

Primary Examiner, Art Unit 2181